

# Breeding of the pigmy hog *Sus salvanius* (Hodgson) in northern Assam<sup>1</sup>

JEREMY J. C. MALLINSON

Zoological Director, Jersey Wildlife Preservation Trust,  
Jersey, Channel Islands

(With two plates and a text-figure)

## INTRODUCTION

The 're-discovery' of the pigmy hog *Sus salvanius* in the Himalayan foothills of Assam during March, 1971 put paid to various gathering reports, including E. P. Gee's (1964), that this interesting and unusual member of the pig family was feared to be extinct. The circumstances leading up to the re-appearance of the pigmy hog was referred to in a previous paper (Mallinson 1971), as well as in reports by the 'Oryx' magazine (1971), by Tessier-Yandell (1971 a & b) and by Ranjitsinh (1972).

The purpose of this paper is to record the data that has accumulated between the time of two visits to Assam, during the period May, 1971 and November, 1976. The information, when correlated, presents a much clearer picture as to the reproductive biology of the pigmy hog, as well as establishing some behavioural characteristics that have not previously come to light.

## CAPTIVE STOCK

In May, 1971 I obtained some valuable quantitative data on the pigmy hogs kept in three separate locations in the Mangaldai subdivision, of Darrang Division, in Northern

Assam. Tables 1-3 provide checklists of specimens that have been taken from the wild state, have been reared in captivity, as well as providing data on the total captive populations on five different occasions in 1971, 1972, 1974, 1975 and 1976 respectively.

TABLE 1

CHECKLIST OF *Sus salvanius* TAKEN FROM  
WILD STATE

Date	Adults		Sub-Adults		Total
	♂	♀	♂	♀	
April 71	3	12	0	1	16
1972-73	2	1	0	0	3
1974	1	2	1	2	6
1975	3	2	1	0	6
Total	9	17	2	3	31

TABLE 2

CHECKLIST OF *Sus salvanius* REARED IN CAPTIVITY  
IN ASSAM

Date	♂	♀	Total	Location
24.Apr.73	3	1	4	Paneery Tea Estate
18.May 76	1	1	2	Attareekhat Tea Estate
May 76	2	2	4	Gauhati Zoo
Total	6	4	10	

It can be seen from Tables 1-3 that in a five year period 1971-1975 inclusive, 31 pigmy

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hogs were taken from the wild state. In addition to the 10 specimens that were reared in captivity, if all of the wild caught specimens had survived, a total population of 41 pigmy hogs (17 ♂♂, 24 ♀♀) could have been expected. However, from the checklist of specimens taken on five occasions over the five and a half year period, it is evident that 24 out of the 31 taken into captivity have since died; and that in November, 1976 only 7 (4 ♂♂, 3 ♀♀) of the wild caught specimens remained.

45.7-50.8 cm. The shoulder height ranges in adult males 22.9-30.5 cm, and in adult females 20.3-21.6 cm. It is interesting to note that the 330 day old male that had been hand-reared at Paneery, was 0.400 kg heavier than an adult female.

## BREEDING

### Gestation Period

So far, no information has been recorded to provide an accurate gestation period for the pigmy hog. The period of gestation for the

TABLE 3

CHECKLIST OF *Sus salvanius* IN CAPTIVITY IN ASSAM

Date	Adults		Sub-Adults & Juveniles		Total	Reference
	♂	♀	♂	♀		
25. April 71	3	11	1	3	18	Mallinson (1971) Tessier-Yandell (1971)
8. April 72	2	3	0	0	5	Ranjitsinh (1972)
June 74	3	4	3	1	11	Wrangham (1974)
June 75	7	7	1	2	17	Oliver (1975)
Nov. 76	6	4	4	3	17	Mallinson

## MEASUREMENTS

In a previous paper (Mallinson 1971), Table 1 presented two references to the measurements of *Sus salvanius* that had already been quoted in literature; and Tables 2 & 3 recorded measurement of the 2 specimens that were examined at the Attareekhat and Paneery Tea Estates, in Northern Assam. In this paper, Table 4 presents further references to published data, as well as providing some new recordings of both measurements and weights.

It can be seen in Table 4 that the muzzle (tip of nose) to base of tail range of measurements for adult males is 66-71 cm, for adult females 55.2-62.2 cm, and for sub-adult males

more common South American collared peccary *Tayassu tajacu* was for a long time considered to be similar to that of the domestic pig 112-116 days; but recently, more exact data has been recorded by Mohr (1960), Schmidt (1976), Sowls (1961, 1966), and by the Jersey Zoo (Mallinson 1974), which presents a gestation range for this species of a period between 142-149 days. However, it is considered that in all probability the gestation period for the pigmy hog is likely to be less than that of a peccary, with an approximate range of 110-120 days.

### Breeding Season and Litter Size

Hodgson (1847) stated that the grown male perhaps pairs off for a short period in the

TABLE 4

MEASUREMENTS OF *Sus salvanus*

Age of Specimen	Sex	Muzzle to Base of Tail (cm)	Shoulder Height (cm)	Weight (Kg)	Reference or Source
Adult	♂	66	27.9	—	Burke (1937:152)
"	♂	66	30.5	—	Lydekker (1900:267)
"	♂	71	22.9	—	Mallinson (1971:427)
"	♂	—	—	9.700	Schmidt (1977- <i>in verbis</i> )
"	♀	54.8	—	—	Garson (1883:413)
"	6 ♀ ♀	55.2 - 62.2 (range)	20.3 - 21.6 (range)	—	Mallinson (1971:427)
"	♀	—	—	6.600	Schmidt (1977- <i>in verbis</i> )
Sub-Adult	♂	45.7 - 50.8	20.3 - 25.4	3.200 - 4.500	Hodgson (1847:423)
	♂	49.5	21.6	3.700	Mallinson (1971:427)
	♀	49.5	20.3	3.400	Mallinson (1971:427)
Infant development					
Approx. Av. 3 ♂ ♂ & 2 ♀ ♀					
3 days		15.2	—	0.050	Wrangham (1974- <i>in lit.</i> )
42 "		22.9	—	0.500	" " "
63 "		33	—	1.100	" " "
330 "	♂	66	25.4	7.000	" " "

breeding season, of which there are said to be two in a year, and the litter to consist usually of but 3 or 4 young ones.

A male and three females were purchased (for £125) by the Zoological Society of London, on 1st May 1882 and 9 young were born in the years 1883-1886 all between the dates 16th May—23rd June (Flower 1929). Zuckerman (1953) only records 8 young in three litters but an examination of the daily occurrences of the Society reveals that there were four litters, the fourth being easily overlooked because it had not been entered as clearly as the others. None of those young lived long as is shown in Table 5.

As has been found to be the case with the records of litter sizes of some other species at the London Zoo, in the 19th Century only live births were recorded; therefore, after taking into consideration the data provided in Table 6 it seems unlikely that the two litters of singletons referred to in Table 5 represent

the actual number born to the respective litters.

The only other previously published record as to litter size, was that of the four young, which were conceived in the wild, and born at the Attareekhat Tea Estate in Northern

TABLE 5

CHECKLIST OF *Sus salvanus* BORN AT ZOOLOGICAL SOCIETY OF LONDON

Date	Number born	Comment
23 May 1883	4	1 eaten by dam same day 1 dead next day 1 died day after that
16 May 1884	1	died 2 days later
11 June 1885	3	all died two days later
23 June 1886	1	eaten by dam 12th July

Assam, 1971 (Mallinson 1971). Since that time, eight further births have been recorded all of which were conceived in a captive environment in Assam, and took place within a thirty-seven month period, April 1973—May, 1976.

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TABLE 6

TIME OF YEAR AND LITTER SIZE OF *Sus salvanus* BORN IN CAPTIVITY IN ASSAM DURING PERIOD APRIL, 1971 - MAY, 1976

Litter No.	Date	♂	♀	Unsexed	Total	Location	♂ Reared	♀ Reared
1.	28. April 71	1	3	0	4	Attareekhat	0	0
2.	24. April 73	3	3	0	6	Pancery	3	1
3.	30. April 73	2	1	1	4	Pancery	0	0
4.	May 74			3	3	Gauhati Zoo	0	0
5.	April 75			3	3	Pancery	0	0
6.	April 75			3	3	Attareekhat	0	0
7.	May 75			3	3	Gauhati Zoo	0	0
8.	18. May 76	2	1	0	3	Attareekhat	1	1
9.	May 76	2	2	2	6	Gauhati Zoo	2	2
Total					35 born		10 reared	

It can be seen from Table 6 that during the five year one month period April, 1971 to May, 1976 inclusive, 10 ♂♂, 10 ♀♀, and 15 unsexed pigmy hogs were born in three different locations in Assam. The litter size varied from 3-6; with five litters of 3 two of 4 and two litters of 6 recorded. The pigmy hog only has three pairs of mammae which is considerably less than those possessed by the majority of other members of the pig family. Sows (1966) reports that the collared peccary has two pairs of functional and two pairs of non-functional mammae, and that in observations taken from 29 litters, 79% of the instances the litter size was two. With the collared peccary, only the posterior two pairs of mammae are completely functional; whereas, all of the pigmy hog's mammae are functional (Joti 1976). The latter factor will obviously facilitate the successful rearing of the slightly larger litters concerned.

Contrary to the previous belief that the pigmy hog probably breeds twice in one year (Hodgson 1847) Fig. 1 shows that all of the birth dates so far recorded in captivity in Assam have occurred within the two months

April and May. The four births recorded at the London Zoo in the 1880's occurred within the two months May and June; however, it is considered that the discrepancy of the April/May birth peak recorded in Assam represents a function of the photo-period shift to a more northern hemisphere schedule. Therefore, it is apparent from the data gathered, that the pigmy hog adheres to a definite breeding season which only takes place once a year between the months of April-May. Assuming an approximate gestation period of 110-120 days, from the birth dates shown in Table 6 conception in the wild state probably takes place during the months of December-January; and parturitions, as has been shown with captive specimens in Assam, during the months of April and May.

## Climatic Conditions:

Gogoi (1976), states that the rainy season commences in Assam from the month of April and continues up to the middle of October; the intervening period from November to March is almost dry except for occasional showers. The pre-monsoon showers, or as known locally as "the little rains" occur pre-



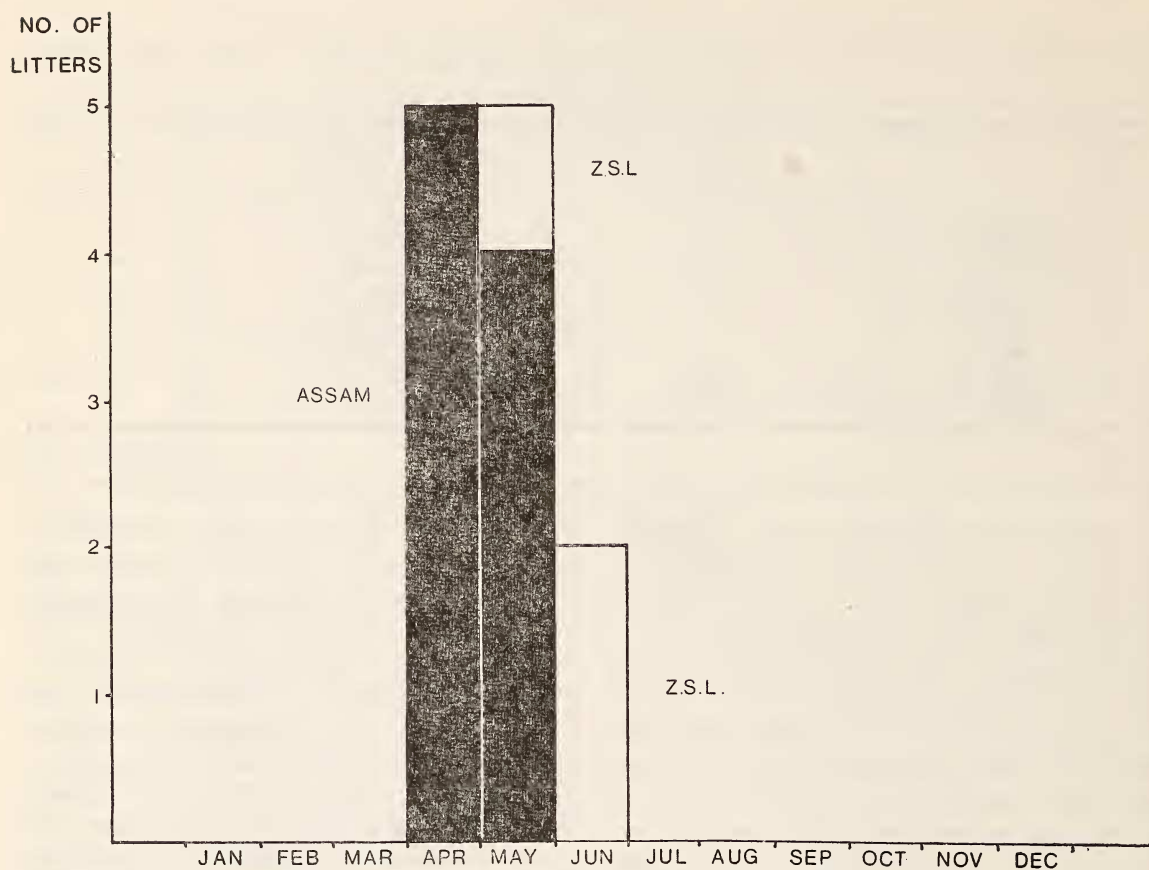


Fig. 1. Frequency distribution of months of birth for 12 litters of *Sus salvanius* born in captivity in Assam and at Z.S.L., London.

dominantly in April; these rains have the effect of resuscitating the flora, when leafless deciduous trees become green with new leaves and the grasslands start to re-shoot. The month of May is normally drier prior to the commencement of the main monsoons during the following month. The months of December and January are the coldest part of the year with minimum temperatures varying from 7°C. to 11°C., the higher ranges of the hill districts are colder than the plain areas. The maximum temperatures range from 30°C. to 37°C.

As with many animals, parturitions will take place when environmental conditions are the most favourable. Sowls (1966), confirms that the peccary definitely has a peak of parturition at that time of the year when food is most abundant. The jungle and thatchlands of the Himalayan foothill habitat of the pigmy hog are frequently waterlogged during the main monsoons; which would undoubtedly be unsuitable for the successful rearing of this diminutive species. It therefore only seems natural, that both conception and parturition should take place in the dry season. Also, it

appears that parturition in the wild state has been arranged to coincide with "the little rains", so that the newly born piglets may benefit from the additional nutritional food-stuffs that have sprung to life after these rains in April; as well as the hogs benefitting from the drier and warmer weather of the following month, prior to the onset of the monsoon in June.

#### Rearing:

Out of the ten piglets successfully reared, as shown in Table 6 the four young from litter No. 2 had to be hand-reared due to the loss of the sow at Pancery three days post-partum. The piglets that were reared from litter No. 8 at Attareekhat, and litter No. 9 at Gauhati Zoo, were reared by their respective mothers. However, in both of the latter cases, the sow had been separated from the male or the other adults in the group prior to parturition taking place. They were also kept apart from other adults throughout the period of rearing.

Joti (1976), stated that the sow that gave birth at Attareekhat in May, 1976, confined herself to the nest for the first three to four days, only coming out to feed when nobody was around at night. The piglets did not venture out of the nest until the 5th or 6th day; but when doing so always kept close to, and to the rear of the dam.

The four piglets hand-reared by A. Wran-gham at Pancery were initially bottle fed every two hours day and night on un-diluted cow's milk, and they took approximately 12 cc each per feed. The multi-vitamin preparation *Abidec* was added to each feed. When one week old, they were given the baby food preparation *Farex* mixed with cows milk, which was in addition to the bottle feed. At three weeks, the piglets were eating the *Farex* on their own, and by nine weeks

they were fed four times a day on a variety of food which included minced meat, sweet potatoes mashed in milk, unpolished rice boiled in milk, fish boiled in milk, fruit and vegetable matter, i.e. papaya, pineapple, mango, lichee, peach, banana, strawberry. A calcium syrup supplementation was also added to the diet.

During the period of rearing, the amount of natural hazards that the piglets may be subjected to is well illustrated by the experiences of Gauhati Zoo during May, 1976. Two out of the six piglets that were born were taken from an un-roofed enclosure at the zoo; one specimen by an Indian Mongoose *Herpestes edwardsi*, and the other by either a Crow *Corvus splendens* or an Eagle Owl, *Bubo* sp. Due to this predation, the sow and the remaining four piglets were removed to a covered-in area provided with plenty of privacy, where they were subsequently reared successfully.

#### BEHAVIOUR

In previous literature, Hodgson (1847) makes reference to the fact that the pigmy hog seems to have the disposition of the peccary as well as the resemblance. The males will fearlessly attack intruders, charging and cutting the naked legs of their human or other attackers with a speed that baffles the eyesight, and a spirit which their straight sharp canines renders really perplexing if not dangerous. Hamilton (1921), refers to the pigmy hog moving through the grass with such rapidity that the eye is unable to follow them and that the little creatures have tusks as sharp as razors.

During May, 1971, I observed how surprisingly non-aggressive the ten specimens were that I handled after they had been in captivity for a number of weeks; as well as the

fact that they moved like lightning, keeping close together, before reaching the security of a pile of thatch where they would pile on top of each other. It was also observed, that prior to giving birth, the female made a nest within the thatch. Since this observation, further interesting information as to the pigmy hog's ability as a nest maker has been obtained.

As far as the ones held in captivity are concerned, nests are constructed throughout the year, and they are made by both male and female specimens. While making the nest, the hogs will pick the thatch up in their mouths, carry it to the new nest sight, 'chaffing' at the material as they go. Once the nest is completed, the thatch is piled over a slightly raised dais of earth which the hogs have routed into position with their snouts. The surface of the mound is concave, which enables the hogs to lie and rest at slightly above ground level so that when it does rain they are able to dry, from being insulated underneath and protected above by the thatch canopy. Due to the nature of the nest, it is often difficult to determine as to which way the hogs have entered into it, for the thatch seems to fall back into place very easily; subsequently, the camouflage of these resting areas is excellent.

References have already been made to the pigmy hogs speed, as well as to how easily they will take flight. However, it is possible to walk almost right up to the nest before they will break cover, and due to the absence of any obvious exit, it is unlikely that one will know as to which direction they will come out of it. When a potential danger presents itself, it is interesting to note the way that they will approach it in 'fits and starts', trotting a few steps, stopping, and then trotting a few more. However, like so many timorous ani-

mals with an extreme tendency to flight, once they have established a safe zone within a known territory; providing this zone is not encroached upon, they will become surprisingly tame. Recently, this was well illustrated by the pair of pigmy hogs that I brought back to Europe in November, 1976; for whilst undergoing the necessary period of quarantine in Zurich, Switzerland, it was not long before these hitherto nervous specimens, allowed their custodian. Markus Borner, "to even handle them a little bit without any excitement at all" (Schmidt—*in lit.*).

Also Magor (1976) makes reference to how tame the young will become and how they appear to welcome and enjoy human company, coming out of cover to greet people who they know, often relishing a back scratch. Wrangham (1974) refers to how the young will play together 'jousting' nose to nose.

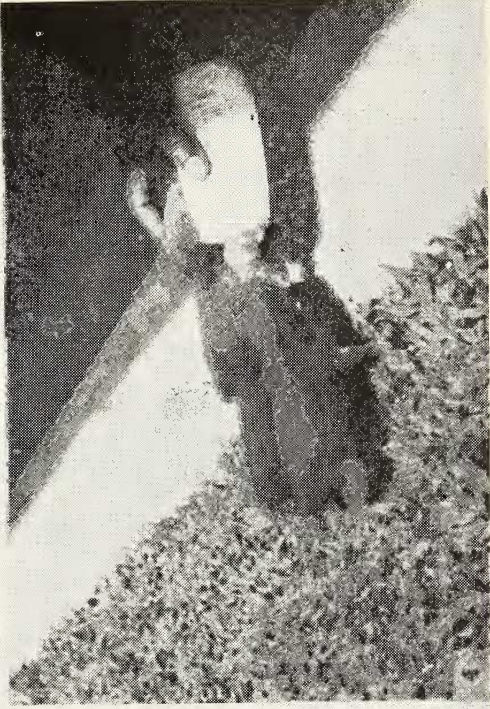
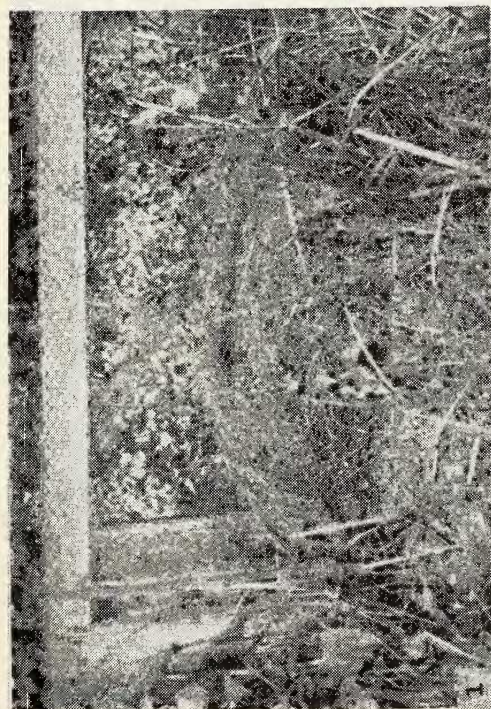
The ability of the pigmy hog to swim well has been described by J. G. Oliver (1976-*in verbis*); for during the height of the monsoons the specimens kept by him on behalf of the Assam Valley Wildlife Society at Per-tabghur were frequently observed swimming across a wide gully in their enclosure.

#### DISTRIBUTION AND RECENT SIGHTINGS

The distribution of the pigmy hog along the Himalayan foothills, and the nature of the habitat in which it is to be found has already been dealt with (Mallinson 1971). Therefore, this paper confines its references to sightings and the subsequent locations of the pigmy hog that have taken place in Assam since its 'rediscovery' in 1971.

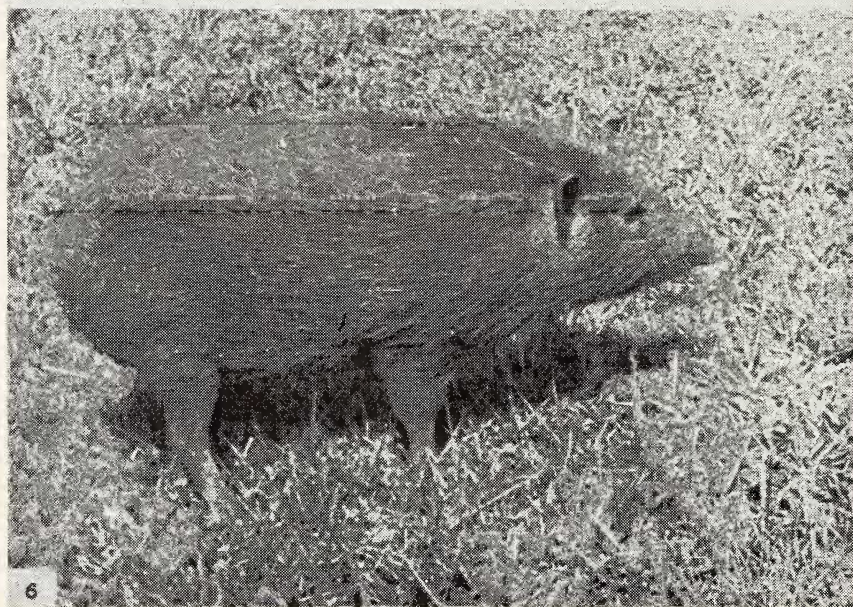
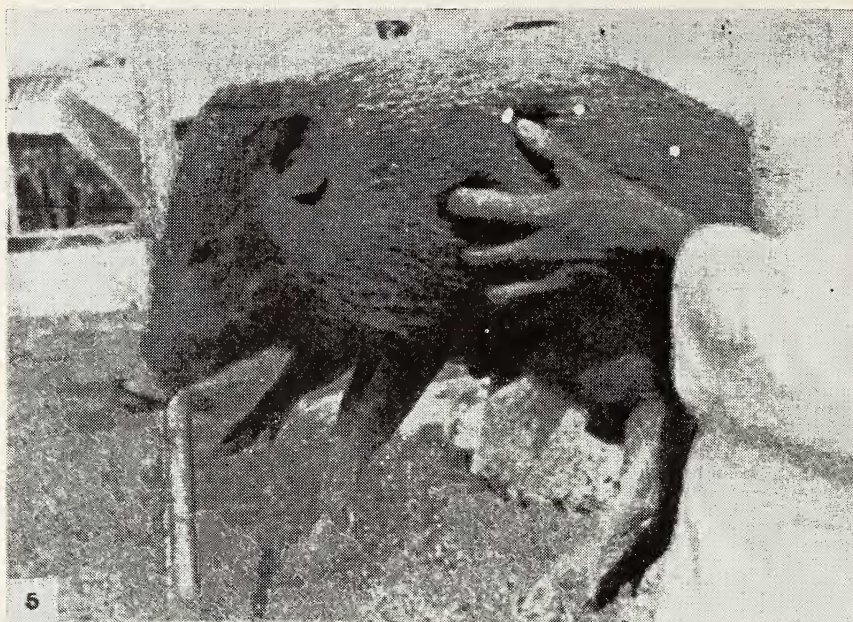
It is considered that all of the thirty-one or so specimens that have been taken into captivity, originated from the Bornadi Forest Reserve which covers an approximate area of





Photos. 1. A nest of the Pigmy Hog; 2. The inside of a nest; 3. A Pigmy Hog at 3 days old; 4. Pigmy Hogs at 3 weeks old.  
(Photos: A. Wrangham)





Two photographs of an adult Pigmy Hog.  
(Photos: D. Joti)



45 square miles in Northern Assam. The Deodunga River makes up the northern border of the reserve which is situated on the Assam-Bhutan International boundary. Within this reserve area, sightings of the hog have been made between the Bagamati camp in the west, the Malapara camp in the north-east and the Rajagarh camp in the south. In October, 1976 it was reported that a sounder of seven hogs were observed in close proximity to the Rajagarh range office; and that sounders of up to ten had been seen further to the north of this area.

A pigmy hog was photographed in 1971, in the Manas sanctuary, which is 130 miles to the west of the Bornadi range (Oryx 1971). It has also been recorded by Ranjitsinh (1972) to have been reported in six different areas of the Manas sanctuary: Latajhar Forest near Matharguri, north-east of Bhuyapara rest house, west of Bhatgali Beat, north of Bansbari Range H.Q. on both sides of the Matharguri Road, and in the Uchila area; it is also considered to occur in other suitable areas in Manas.

To the east of the Bornadi Reserve: Tesier-Yandell (1971) makes reference to a sighting by Gilchrist in February, 1971 at Nonaipara Tea Estate, situated approximately five miles away; a reported kill on the Majuli Tea Estate in September, 1970 situated approximately 7 miles away; and Ranjitsinh (1972) refers to reports of the pigmy hog in the Nono Forest Reserve twenty miles to the east of Bornadi. There have been some rather vague reports that the hogs have been seen in the Orang Sanctuary which is approximately 45-50 miles to the east of Bornadi, as well as claims that they have been observed approximately 100 miles further to the east on the Dufflaghar Tea Estate, just to the east of the Boro river (Simpson—*in verbis*). From

the data so far gathered, it appears that the pigmy hog's distribution in Assam extends from the valley of the Manas river, extending eastwards along the foothills bordering Bhutan and Arunachal Pradesh (Synom. N.E.F. A.) up to Lakhimpur district in the north-east border of Assam. The width of this foothill belt being approximately 5-15 miles.

#### CONSERVATION

The pigmy hog was afforded total protection in India under the Wildlife (Protection) Act 1972. Ranjitsinh (1972) advocated that the Bornadi Forest Reserve immediately to the north of Rajagarh village, and the unclassified State forest to the west of the Reserve should be declared a reserve for the pigmy hog. Also, that the Nono Forest Reserve to the east of Bornadi should be considered a sanctuary. Suggestions were also made by Ranjitsinh, that a suitable area of habitat should be fenced off, possibly in the Bornadi Forest Reserve or in the Uchila central area of the Manas sanctuary, so that the pigmy hog could be protected, studied, and a controlled breeding programme initiated.

During 1975, the Assam Valley Wildlife Society in collaboration with the Assam Forest Department, erected a chain-link fence round a five hectare enclosure in the Orang Wildlife Sanctuary. In May 1976, a pair of pigmy hogs were released by Mr. J. G. Oliver, Chairman of the Assam Valley Wildlife Society, into a small area within the enclosure; however, some two months later, these were reported to have escaped into the larger fenced in area, and no further sightings of them have so far been reported.

Previously (1971), I suggested that sufficient animals should be caught up in order to strengthen the viability of the existing captive

population within the species' range; as well as advocating that some should be translocated to a scientifically managed site. Thanks to the co-operation of the Assam Government, the Chief Conservator of Forests Mr. M. Islam, the Indian Government and the Assam Valley Wildlife Society. The Jersey Wildlife Preservation Trust was granted permission to export up to four specimens of this endangered species to a scientifically managed site in Europe. During 27th/28th November, 1976 I accompanied a proven breeding pair of pigmy hog from Attareekhat tea estate in Northern Assam, by road to Gauhati, and then by air to Calcutta 'en route' to Europe. Owing to quarantine legislation, especially those restricting the movement of members of the pig family; the pigmy hogs were taken to Zurich, Switzerland, where they had to undergo a period of quarantine at the Zurich Zoo. It is now hoped, that with the co-operation of the authorities at Zurich Zoo, that a breeding nuclei of this endangered species will soon be established.

#### SUMMARY

During my two missions to Assam in May, 1971 and November, 1976 respectively, valuable quantitative data was gathered about this, once considered to be possibly extinct species. The majority of the knowledge that we now have about pigmy hogs, has derived as a consequence of the hogs 're-discovery' in March, 1971 and goes to augment the previous only fragmentary data, the majority of which stemmed from nineteenth century observations.

Contrary to previously published data, the pigmy hog adheres to, a single breeding season which occurs in Assam during the months April/May. Both male and female specimens construct nests made out of 'thatch' and these

are utilised both for resting as well as for rearing young. The pigmy hogs are chiefly diurnal; and the young almost entirely lack the longitudinal markings to be found on the back and sides of many other wild pig species. Additional data has also been established as to their measurements, weights, litter sizes, as well as numerous behavioural and husbandry criterions.

Although the mortality of the ones that have been kept in captivity has been unacceptably high, and the infant survival rate minimal; from the experiences gained, it is now evident that providing the species is kept under favourable conditions, and certain guidelines discussed in this paper adheres to, pigmy hogs can be kept easily and will breed and reproduce readily. However, in interpreting data on the breeding in wild and captive animals, the question always arises as to whether the conclusions drawn from data on captive animals are representative of wild populations.

Since my first mission to Assam, and as advocated previously (Mallinson 1971) preliminary evaluation of the habitat and a plan for the future conservation of the pigmy hog has been carried out by Ranjitsinh (1972). Some further specimens have been caught to strengthen the viability of the captive populations within the species range, (Table 1). And one pair of pigmy hog has been taken to a scientifically managed site in Europe under the custodianship of the Jersey Wildlife Preservation Trust (JWPT). These two animals have been loaned by the Assam authorities so that a captive breeding programme can be initiated and all scientific data recorded from this nuclei is to be sent to the Chief Conservator of Forests in Assam.

However, due to the forever increasing intensity of human encroachment into the pigmy hog's remaining habitat, it is now essen-